

New independent claim 81 provides for a surface light emitting device and a substrate for supporting the device, wherein the surface light emitting device includes a protrusion with an opening. The benefits of the present claimed invention are as follows. In prior art Fig. 2 of the present application, it can be seen that, typically, an optical fiber sends light to a tip through a protrusion, but that there was a coupling loss between the light emitted from the fiber and that not reaching the protrusion. It will be seen that prior art Fig. 2 is identical substantially to Figs. 2 and 7H of Ohta '790. In Ohta and the discussed prior art it can be seen that the light emitted from an aperture is introduced through an optical fiber, i.e., 103 of Fig. 2 in Ohta and that this occasions a coupling loss. To the contrary, in the present claimed invention, as shown in Fig. 5B, light is emitted from the surface light emitting device directly through the protrusion. No coupling loss is engendered.

In a second aspect to the invention as set forth in claim 93, an elastic supporter is provided for the surface light emitting device. In Shimada '226 as illustrated in Fig. 1, an elastic support is provided, but no surface light emitting device is formed thereon. In Ohta '790 a non-flexible, stiff substrate 101 is conventionally provided, not an elastic substrate. Further, there is no surface light emitting device on the elastic supporter. Instead, an optical fiber is fitted and fixed in the opening of the silicon substrate as shown in Fig. 1. In Fig. 20, light is emitted from layer 805 through aperture 813. However, the surface light emitting device does not include a protrusion, merely an opening. In addition, in Fig. 20, no elastic supporter is present. The substrate 801 is a conventional thick, non-elastic substrate.

Fujii '084 fails to teach or suggest a surface light emitting device having a protrusion with an opening. The insulating substrate employed, 21, is disclosed to be a sapphire substrate, which is inflexible.

Wherefore, none of the references discloses or suggests the present claimed invention nor renders it unpatentable.

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ABSTRACT OF THE DISCLOSURE

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--A surface optical apparatus that includes a surface optical device with p-side and n-side electrodes, such as a surface emitting laser, a first substrate for supporting the surface optical device directly or through an elastic supporter formed of [a] one or plural layers, and a first electrode wiring of at least a wire formed on the first substrate and electrically connected to one of the electrodes. A current is injected into or a voltage is applied across the surface optical device through the first electrode wiring and the p-side and n-side electrodes. A photodetector for detecting light from the surface optical device may also be arranged in the vicinity of the optical device.--